

THE INVENTION CLAIMED IS:

1. An active pixel sensor system comprising:
photosensing circuitry for providing a photosignal related to an intensity of incident
light on a pixel during an exposure period; and
5 converting circuitry operatively connected to said photosensing circuitry to provide an
intensity-time signal in a first duration or second duration during the exposure
period in response to incident light of a respective first or second range of
intensities and to respond to the intensity-time signal to provide a first digital
count or a sum of first and second digital counts related to the intensity of the
10 incident light of the respective first or second range of intensities.
2. The active pixel sensor system as claimed in claim 1 including system
circuitry operatively connected to the converting circuitry to provide faster digital counts
during the second duration than during the first duration.
3. The active pixel sensor system as claimed in claim 1 wherein the converting
15 circuitry includes comparing circuitry for comparing the photosignal to a constant signal
during the first duration and a ramped signal during the second duration to provide the
intensity-time signal.
4. The active pixel sensor system as claimed in claim 1 wherein the photosensing
circuitry has:
20 a photosensor for providing the photosignal proportional to the intensity of light
incident on the pixel;
and including system circuitry having:
reference signal circuitry for providing a constant signal during the first duration and
adding a ramped signal during the second duration to provide the intensity-
25 time signal; and
counter circuitry for providing the first counts during the first duration and faster
second counts during the second duration;
and wherein the converting circuitry has:
comparing circuitry for comparing the photosignal to the constant signal during the
30 first duration or the constant and ramped signals during the second duration to
provide the intensity-time signal; and
register circuitry for registering the number of counts until the intensity-time signal is
provided.

5. The active pixel sensor system as claimed in claim 1 including system circuitry for a plurality of photosensing circuitry.

6. An active pixel sensor system comprising:

photosensor circuitry for providing a photosignal proportional to an intensity of incident light on a pixel during an exposure period;

a reference signal circuitry providing first and second reference signals during respective first duration and second durations during the exposure period;

a comparator responsive to the photosignal and the first and second reference signals to provide an intensity-time signal during the respective first duration or second duration in response to incident light of a respective first or second range of intensities;

a counter for providing first and second digital counts during the respective first and second durations during an exposure period; and

a register for storing the first and second digital counts until the intensity-time signal is provided whereby the sum of the digital counts are proportional to the intensity of light.

7. The active pixel sensor system as claimed in claim 6 wherein the counter provides faster digital counts during the second duration than during the first duration.

8. The active pixel sensor system as claimed in claim 6 wherein the reference signal circuitry provides a constant signal during the first duration and a ramped signal during the second duration.

9. The active pixel sensor system as claimed in claim 6 including:

a photosensor in the photosensing circuitry for providing a photosignal inversely proportional to the intensity of light incident on the pixel;

an initial reference input for providing an initial reference signal during the first duration;

a ramp generator for generating an increasing ramped signal during the second duration;

an adder for adding said initial and ramped signal and providing the added signal to the comparator;

a multiplexer for switching the counter to provide the first counts during the first duration and faster second counts during the second duration;

a start input connected to the ramp generator and the multiplexer to signal the start of the second duration; and

a reset input connected to the photosensor circuitry to signal the beginning of the first duration.

5 10. The active pixel sensor system as claimed in claim 6 wherein a plurality of photosensors, comparators, and registers are provided for a counter and a reference signal generator.

10 11. A method for active pixel sensing comprising:
providing a photosignal related to an intensity of incident light on a pixel during an exposure period;

providing an intensity-time signal in a first duration or second duration during the exposure period in response to incident light of a respective first or second range of intensities; and

15 responding to the intensity-time signal to provide a first digital count or a sum of first and second digital counts related to the intensity of the incident light of the respective first or second range of intensities.

20 12. The method for active pixel sensing as claimed in claim 11 including providing faster digital counts during the second duration than during the first duration.

25 13. The method for active pixel sensing as claimed in claim 11 including comparing the photosignal to a constant signal during the first duration and a ramped signal during the second duration to provide the intensity-time signal.

30 14. The method for active pixel sensing as claimed in claim 11 wherein:
providing the photosignal provides a photosignal proportional to the intensity of light incident on the pixel;

and including:

providing a constant signal during the first duration and adding a ramped signal during the second duration; to provide the intensity-time signal; and

providing the first counts during the first duration and faster second counts during the second duration;

and wherein:

providing the intensity-time signal includes comparing the photosignal to the constant signal during the first duration or the constant and ramped signals during the second duration to provide the intensity-time signal; and

responding to the intensity-time signal includes registering the number of counts until the intensity-time signal is provided.

15. The method for active pixel sensing as claimed in claim 11 including providing a plurality of photosignals.

5 16. A method for active pixel sensing comprising:

providing a photosignal proportional to an intensity of incident light on a pixel during an exposure period;

providing first and second reference signals during respective first duration and second durations during the exposure period;

10 responding to the photosignal and the first and second reference signals to provide an intensity-time signal during the respective first duration or second duration in response to incident light of a respective first or second range of intensities;

providing first and second digital counts during the respective first and second durations during an exposure period; and

15 storing the first and second digital counts until the intensity-time signal is provided whereby the sum of the digital counts are proportional to the intensity of light.

17. The method for active pixel sensing as claimed in claim 16 wherein providing the first and second digital counts provides faster digital counts during the second duration than during the first duration.

20 18. The method for active pixel sensing as claimed in claim 16 wherein responding to the photosignal and the first and second reference signals uses a constant signal during the first duration and a ramped signal during the second duration.

19. The method for active pixel sensing as claimed in claim 16 including:

providing a reset signal to begin the first duration;

25 providing a photosignal current proportional in time to the intensity of light incident on the pixel;

providing an initial reference signal during the first duration;

generating an increasing ramped signal during the second duration;

adding the initial and ramped signal and providing the added signal to the comparator;

30 switching to provide the first counts during the first duration and faster second counts during the second duration;

providing a start signal to begin the second duration; and

using the intensity-time signal to end the second duration.

20. The method for active pixel sensing as claimed in claim 16 including providing a plurality of photosignals and providing a single set of first and second digital counts for the plurality of photosignals.